

What is a Monitoring Protocol and Why do we need them?



Steve Fancy
National Monitoring Program Leader
National Park Service

What is a Monitoring Protocol and Why do we Need Them?



“Monitoring protocols are detailed study plans that explain how data are to be collected, managed, analyzed, and reported, and are a key component of quality assurance for natural resource monitoring programs” (Oakley et al. 2003)



Designing a long-term monitoring program is like getting a tattoo: you need to really think about what you want, because making major changes later will be messy and painful.

Protocol Development is an expensive, time-consuming process that requires a research component.

Designing a Monitoring Program requires a large up-front investment that should be captured in the protocol document

Why are Protocols Especially Important for Long-term Monitoring?



We need to be certain that changes detected by monitoring actually are occurring in nature and not simply a result of measurements being taken by different people or in slightly different ways

- Long-term monitoring; Different people will be doing the monitoring; changeover in personnel is expected.
- Experts that design the protocol and plans for analysis will retire or change jobs.
- Necessary to share/compare approach and results among different agencies and among sites.



☒ Nature & Science ☐ NPS

Input Search Here Search

Advanced Search
Search A to Z



Vital Signs Monitoring

Discovering and protecting America's natural heritage

Nature & Science >

I & M Home >

Program Administration & Organization

Program Goals
National Framework
3-Phase Approach
Meeting Notes & Presentations
PowerPoint Gallery

Design & Technical Guidance

Goals & Objectives
Conceptual Models
Vital Signs
Sampling Design
Protocols
Data Management
Reporting
Technical Guidance

Other Important Links

Monitoring Plans
Key Documents
Literature Cited
Glossary
Monitoring Intranet

What's new on the Monitoring Internet

Download "An Overview of Vital Signs Monitoring & its Central Role in Natural Resource Stewardship & Performance Management"

Download Vital Signs Monitoring Brochure

Program Administration & Organizational Framework

Justification for Integrated Natural Resource Monitoring
Legislation and Policy
Definition of Key Terms

Glossary of Terms as used by NPS I&M Program
National Framework for I & M
National and Regional Oversight
Natural Resource Program Center & MTAG
Basic Resource Inventories
Prototype Monitoring Programs
Vital Signs Monitoring Networks

Monitoring Planning & Design: The 3-Phase Approach
Monitoring Plan Outline
Monitoring Plan Checklist Memo
Ecological Monitoring Framework
Schedule - Network Due Dates for Phase 1, 2, 3
Peer Review and Approval Process

Other Links & Documents

List of Coordinators and Data Managers
Meeting Notes and Presentations
Literature Cited and Extended Bibliography
Download Documents for Designing a Monitoring Program

NPS > Nature & Science > Inventory & Monitoring > Vital Signs Monitoring

Guidance for Designing an Integrated Monitoring Program

Introduction
Integration: Ecological, Spatial, Temporal & Programmatic
Establishing Monitoring Goals & Objectives
Examples of Specific, Measurable Monitoring Objectives
Developing Conceptual Models of Ecosystem Components
Prioritizing & Selecting Vital Signs - What Should be Monitored?
Sampling Design Considerations - Where & When to Sample
Monitoring Protocols

Required Content/Format of Protocols
Protocol Development Process
Guidance for Protocol Development Summary documents

Protocol Database

Protocol Examples from Other Programs & Agencies
Download Example Protocol for Land Bird Monitoring

Data Management and Analysis
Reporting the Results of Monitoring
Recommended Style for Literature Cited in Monitoring Plans
Technical Guidance on Specific Topics

Air Resources
Geologic Resources
Water Resources
WRD Guidance for Designing and Conducting Water Quality

Monitoring
Biological Resources
Invasive Species
Land Birds
Remote Sensing and Landscape Dynamics

Network Monitoring Plans

<http://science.nature.nps.gov/im/monitor>



The National Park Service

Inventory & Monitoring

PROTOCOL DATABASE

[Explanation of Ecological Monitoring Framework](#)

Biological Integrity	Birds	Passerines	CAKN	Research and development phase	Summary	Protocol
Biological Integrity	Birds	Land Birds - vcp counts	MANY	Completed, meets NPS standards for content	Summary	Protocol
Biological Integrity	Birds	Waterbirds-Migrating and Wintering Waterbirds	CACO	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Land Birds	DENA	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Waterbirds-Colonial Waterbirds	CACO	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Land Birds - Breeding Bird Survey	MANY	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Land Birds - MAPS	CACO	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Peregrine Falcons	NCPN	Research and development phase	Summary	Protocol
Biological Integrity	Birds	Land Birds	CHIS	Legacy protocol, for informational purposes	Summary	Protocol
Biological Integrity	Birds	Golden Eagles	CAKN	Research and development phase	Summary	Protocol
Biological Integrity	Birds	Peregrine Falcon	CAKN	Research and development phase	Summary	Protocol
Biological Integrity	Birds	Land Birds	ORPI	Legacy protocol, for informational purposes	Summary	
Biological Integrity	Birds	Waterbirds-Marsh Birds	CACO	Completed, but needs revision to meet NPS standards	Summary	Protocol
Biological Integrity	Birds	Waterbirds-Piping Plover	CACO	Completed, but needs revision to meet NPS standards	Summary	Protocol

<http://science.nature.nps.gov/im/monitor>

Guidelines for long-term monitoring protocols

Karen L. Oakley, Lisa P. Thomas, and Steven G. Fancy

Abstract Monitoring protocols are detailed study plans that explain how data are to be collected, managed, analyzed, and reported, and are a key component of quality assurance for natural resource monitoring programs. Protocols are necessary to ensure that changes detected by monitoring actually are occurring in nature and not simply a result of measurements taken by different people or in slightly different ways. We developed and present here guidelines for the recommended content and format of monitoring protocols. The National Park Service and United States Geological Survey have adopted these guidelines to assist scientists developing protocols for more than 270 national park units.

Key words format, guidelines, monitoring, national park, natural resources, policy, protocol, sampling

NPS-USGS Protocol Standards (**REQUIRED**):

Wildlife Society Bulletin 2003 31(4): 1000-1003.

Recommended Protocol Format

- **Protocol Narrative**
 - Overview of the various components of the protocol
- **Series of Standard Operating Procedures (SOPs)**
 - Written in the form of instructions with step-by-step details of how to carry out the procedure
 - Number and content of SOPs determined by PIs
 - One of the SOPs should describe procedures for making protocol revisions and archiving versions
- **Supplementary Materials**
 - example databases, maps, photographs, etc.

U.S. Department of the Interior
National Park Service

**Bird Monitoring Protocol for Agate Fossil Beds National Monument,
Nebraska and Tallgrass Prairie National Preserve, Kansas**

Prepared by:

David G. Peitz (Ecologist)
6424 West Farm Road 182
Wilson's Creek National Battlefield
Prairie Cluster Long-Term Ecological Monitoring Program
National Park Service
Republic, MO 65738

For the:

Prairie Cluster Long-Term Ecological Monitoring Program,
National Park Service, U.S. Department of the Interior

Table of Contents:

I. Background and Objectives

Issue being Addressed and Rationale for Monitoring Grassland Bird Populations
Measurable objectives

II. Sampling Design

Rationale for selecting this sampling design over others; Site Selection
Population being Monitored; Sampling Frequency and Replication
Level of Change that can be Detected for the Amount/Type of Sampling being Instituted

III. Field Methods

Field season preparations and equipment setup
Sequence of events during field season
Details of taking measurements, with example field forms

IV. Data Management

Overview of database design; Data entry, verification and editing
Metadata procedures; Data archival procedures

V. Analysis and Reporting

Recommendations for routine data summaries and statistical analyses to detect change
Recommended report format with examples of summary tables and figures
Recommended methods for long-term trend analysis (e.g., every 5 or 10 years)

VI. Personnel Requirements and Training

Roles and responsibilities
Qualifications and Training

VII. Operational Requirements

Annual workload and field schedule
Facility and equipment needs
Startup Costs and Budget Considerations
Procedures for Making Changes to and Archiving Previous Versions of the Protocol

VIII. References

Important Note: This sampling protocol consists of this Protocol Narrative and the following Standard Operating Procedures (SOPs):

- SOP 1: Preparations/Equip. Setup Prior to the Field Season
- SOP 2: Training Observers
- SOP 3: Using the Global Positioning System
- SOP 4: Establishing and Marking Sampling Plots
- SOP 5: Conducting the Variable Circular Plot Count
- SOP 6: Documenting Habitat Variables
- SOP 7: Data Management
- SOP 8: Data Analysis
- SOP 9: Reporting
- SOP 10: Procedures/Equip. Storage after the Field Season
- SOP 11: Revising the Protocol